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## Oil Sands: Fuel of the Future

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Edited by L. V. Hills

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This Memoir is the result of a symposium of the same name sponsored by the Canadian Society of Petroleum Geologists and held in Calgary, Alberta, September 5-9th, 1973. It contains all but three of the papers delivered at the symposium. To anyone working with oil sands this Memoir is a must because effectively all aspects of current oil sands exploration and exploitation are covered in the 19 papers and discussion papers. There is something for geologists, geochemists, engineers, economists, environmentalists - even librarians - in this publication, and each can benefit by exposure to the current views of the other professions.

The scene is set by G. W. Govier, who places Alberta's oil sands in their proper primary perspective in the Canadian oil and energy supply picture. Subsequent events may have altered some of the economic aspects but the importance of Alberta's oil sands cannot be denied. The regional geological framework in which the four major oil sand deposits are found is reviewed by D. Jardine, with J. W. Kramers and D. F. Minken presenting their detailed studies of the Wabasca and Cold Lake deposits, respectively. In particular, Kramers brings out the more complex mineralogy of the Grand Rapids Formation of the Wabasca deposit, with respect to the better known Athabasca deposit, and correctly brings to the readers' attention the importance of water-rock interaction during in-situ recovery processes. It is a pity that detailed studies could not have been produced for the Athabasca and Peace River oil sand deposits, although W. I. White has covered some of the

heavy oil occurrences in Saskatchewan. Few will agree with W. B. Gallup's views on the origin of the heavy oil in the Athabasca deposit which is based mainly on other people's geological reports and effectively completely ignores modern geochemical studies.

D. S. Montgomery and his team at the Fuels Research Centre, Ottawa, and a combination of workers from the Institute Français du Pétrole, Paris and the Geological Survey of Canada, Calgary, under G. Deroo, have produced two fine papers on the geochemistry of the heavy crude oils in the Cretaceous of Alberta. Their conclusions are not coincident and the reader is treated to a spirited printed discussion - which this geochemist will not seek to arbitrate, especially since he took an intermediate position in his presentation at the symposium and is convinced that all the evidence is not yet available on which to base firm conclusions. An interesting study by J. Connan and B. M. Van Der Weide contains important implications for the in-situ recovery of heavy oil from deep oil sands, because the heating experiments they carried out on two natural asphalts produced different results depending upon the prior history of the sample and were within the temperature range of current in-situ field tests.

The engineering aspects of oil sands are described in three papers. S. M. Farouq Ali presents a review of all the tried and potential methods of in-situ recovery. The specific problems faced and overcome by Imperial Oil Limited in their steam injection in-situ tests at Cold Lake are described by A. G. Winestock. Both authors stress the slow and costly nature of developing the requisite technology and Winestock, from his experience at Cold Lake, indicates the communication required between geologist and engineer. He might have added geochemists, in view of the fact that at the temperatures and pressures at which Imperial have operated some of their wells - 636°F (335°C) and 2000 psig (0.137 kb) - we are concerned with fluid-rock interaction in effectively greenschist facies of metamorphism. To the uninitiated, the magnitude of the materials handling tasks of current and projected mining operations of oil sands are detailed by V. P. Kaminsky (in five days Syncrude will move as much material as the monthly ore production of the Iron Ore Company of Canada at Schefferville, Quebec) and the problems

of choosing a mining scheme make fascinating reading.

Other papers of more direct concern to Alberta's oil sands are the review by H. V. Page on the environmental impact of the industry and a brief description by P. Marshall of the Alberta Oil Sands Index produced by the Alberta Research Council. The Memoir is completed by three papers dealing with oil sand deposits in Kansas (by W. J. Ebanks, Jr. and G. W. James), Venezuela (by M. B. E. Alayeto and L. B. Louder), and a world review of oil sand deposits by E. J. Walters.

This book suffers from careless and inconsistent editing, which does not detract from the merits of the material included, but it does from the overall impression - at least to a critical reviewer. For example, surely someone should have corrected the registration of Fig. 12, p. 97; or the seven inconsistencies in the table of contents; or the use of Plates instead of Figures in one paper, or the three different ways in which the Acknowledgements are treated - including having to read them in one paper, in italics, even before we read the abstract; and finally, surely the editor could have exercised his prerogative and insisted on changing 'tar' to 'oil' in all cases? Despite these detractions, the Canadian Society of Petroleum Geologists is to be congratulated on producing another winner.

MS received May 26, 1975.